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HUMAN HEALTH AND SAFETY PROBLEMS OCCURRING
IN CALIFORNIA DURING 1975 INVOLVING EMPLOYED
PERSONS USING MALATHION

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SUMMARY

Malathion is a widely used relatively safe organophosphate pesticide. In 1975 in California, physicians filed reports on 16 systemic, 5 eye, and 7 skin injury cases in which malathion was at least one of the pesticides to which the worker was exposed. Most systemic illnesses seemed to involve nausea resulting from the foul odor. There was little evidence of cholinesterase depression. These persons apparently had prompt and uneventful recoveries from the exposures. Considering the large quantity of this pesticide used in California, these statistics indicate that malathion is relatively safe to use.

GENERAL INFORMATION

Malathion is an organophosphate insecticide; the chemical name for which is O,O-Dimethyl S-(1,2 dicarbethoxyethyl) phosphorodithionate or O,O-dimethyl phosphorodithionate of diethylmercaptosuccinate. The acute oral LD₅₀ (rat) is 1375 mg/kg and acute dermal LD₅₀ (rabbit) is 4100 mg/kg. Most formulations are in toxicity category number three.

Malathion is available as technical grade material, wettable powder, dusts, solutions, emulsifiable concentrates, and poison bait.

It is used in the control of many pests of fruits, vegetables and ornamentals. As a public health pesticide, malathion has been employed for the control of houseflies, mosquitos, and lice. For fly control, malathion is used in liquid and dry baits. Its use is particularly indicated where a high degree of safety to mammals is desired - a tolerance of 135 ppm for forage, grass, and green hay allows malathion to be applied on the same day as grazed or harvested. Generally established tolerances are for residues of 8 ppm malathion. Malathion is generally compatible with all insecticides and fungicides in common usage. When mixed with alkaline materials, the initial kills are satisfactory but the residual toxicity may be reduced.

Malathion is not a highly toxic chemical. In the following series of cases of illness, other pesticides were used in combination with malathion. In most cases where organophosphate poisoning was the definitive

diagnosis another pesticide was involved and could be blamed. Most of those chemicals have a much higher toxicity than malathion. Table 1 shows a list of the other pesticides occurring with malathion in the 1975 illness reports. Also included is the chemical type and toxicity category of each. Carbamate poisoning exhibits the same symptoms as organophosphate poisoning. In 15 reported cases no other pesticide occurred with malathion. In many of these it is doubtful that the illness was caused by the pesticide.

Being informed, as well as having an understanding of the implications of pesticide exposure should be required for all those handling such toxic chemicals. Children must be kept from an area where pesticide exposure is possible.

Education in handling procedures is important for all pesticides. Malathion, however, deserves special consideration due to the heavy noncommercial use in addition to commercial utilization. It is handled often by people inexperienced in the use of pesticides and dispensed by nurserymen and gardeners to the homeowner or small businessman. Procedural safety education for this pesticide must therefore be especially explicit.

OCCUPATIONAL EXPOSURE INCIDENTS OF 1975

In one incident handling pesticides seemed to make an applicator nervous. After spraying trees and ornamentals with malathion, he became nauseated and nervous, with tightness in chest. Twice prior to this occurrence he had complained of similar symptoms. However, all of his cholinesterase tests did not indicate any depressions. Diagnosis was anxiety.

One applicator was spraying malathion and inhaled some mist. He felt dizzy, lightheaded, and had nausea and blurred vision. Toxicology studies were made on blood and urine, but they were not completed at time of the report. The employer suspected him to be on narcotics. It was not stated if he was wearing protective equipment.

A nurseryman was spraying in a greenhouse with malathion and Zectran. When he got home, he noticed welts on both arms and a "raspy" throat. He had been wearing a respirator, gloves, and rubber boots, but was not wearing a rain jacket. No tests were taken. He was given steroid cream.

A gardener was having headaches, his eyes bothered him, and he felt irritable after working with pesticides regularly for three years. In order of frequency these included: malathion, Metasystox, chlordane, Zectran, Cygon, and lindane. He regularly wore all protective equipment but admitted to changing the filter in his face mask too infrequently. The diagnosis was possible inhalation of insecticides. There was a cholinesterase test, but results were not recorded on the investigation report.

A man became sick with symptoms of organophosphate poisoning while spraying oranges. He was both mixing and spraying malathion/parathion. Full protective equipment was worn when mixing. He pulled a speed sprayer

behind a tractor and said the spray got on him. Consequently his coveralls became damp, but he did not change them. He became nauseated and had blurred vision. He was then hospitalized for two days. It was diagnosed as parathion poisoning. His cholinesterase levels were low, but baseline data was not obtained. Atropine was used for treatment.

In another spraying incident, a man was instructed to spray the inside of a metal grain storage bin with malathion. He failed to wear his respirator after being told to do so. The next day he went to the doctor and thereafter never again reported to work. His heart and lungs were clear and his cholinesterase test was normal. Diagnosis was congestion of nose and throat.

Symptoms of organophosphate poisoning affected a man while mixing malathion parathion. He went to the doctor, who told him, after examination, to go home, take a shower, change clothes, and rest. The next week he went to his own doctor who ordered a blood test which proved to be normal. He wore protective gear when mixing but took it off when through pouring. Diagnosis was parathion exposure to skin.

A worker's symptoms were diagnosed as chronic organophosphate poisoning. Cholinesterase tests were not performed. The worker felt extreme malaise, exhaustion and experienced a ten-pound weight loss. He was exposed to Thiodan and malathion. Protective clothing and particle mask were worn. A full-face mask was on order at the time.

A worker stated he was using gloves and a respirator when loading malathion-Perthane dusts. After loading the dusts, he felt nauseous. He went to a physician who found his cholinesterase level to be depressed by 25 percent below normal -- though no baseline data was available. The man had probably inhaled dust through a saturated or poorly fitting respirator.

Another worker was burning bags which had contained malathion and sulfur. He slipped his respirator down to his neck, then picked up the bags, expelling dust. He inhaled the dust and coughing resulted. He also inhaled smoke when the wind shifted. Illness was diagnosed as a chemical pneumonitis. There were no tests made.

A warehouse worker went to the doctor complaining of a cough and shortness of breath. Apparently he had inhaled some grain dust which had been treated with malathion while cleaning out an elevator boot. He was provided with a mask but did not use it. He was treated for bronchitis. His cholinesterase test was normal, though no baseline data was available, and the bronchitis seemed to clear up.

A man was irrigating oranges the morning after the field had been treated at night. He stated he did have substantial body contact with the foliage while cleaning out furrows. The fields had been treated with parathion and malathion and was posted. The employer stated all workers were instructed to stay out of treated fields. He was diagnosed as having possible parathion poisoning and pneumonia. He was hospitalized and then confined to home for a week. His cholinesterase levels were low. This was no doubt due to parathion exposure.

A nursery worker developed allergic bronchitis due to inhalation of malathion spray. She had accidentally entered a greenhouse that had been treated a few hours earlier. The malathion spray was said to have dried. She was in the greenhouse about 45 minutes to prune and tape the tomato vines. Possibly her ill feeling was from inhaling fumes. The firm now locks the greenhouses until they are thoroughly ventilated.

A nursery worker spilled a 50 percent solution of malathion on his hand when he picked up a bottle on which the cap had not been securely replaced. Carelessness caused this accident which could have been prevented by simple safety routines.

In most nonagricultural exposures related to malathion, the persons involved were overwhelmed by fumes or the odor. In four cases, containers of malathion were broken.

A clerk at a hardware store knocked a bottle of malathion off the shelf and this spilled on his upper leg. The employee stated he had no ill effects. There were no tests, but the doctor stated he had mild malathion exposure.

A woman broke a pint bottle of malathion and cleaned it up with rags and soap. She was then advised to visit the doctor immediately who diagnosed it as mild malathion poisoning due to skin contact and fumes. Her cholinesterase level was depressed and she was treated with atropine.

In a Santa Barbara County School complex two public works employees accidentally broke a gallon bottle of malathion. Three firemen were called to the scene to help contain the spill. All but one used self-contained breathing equipment. He was nauseated by the odorous malathion and treated at an emergency room. His nose hurt, he felt giddy, and had a headache. Two men were diagnosed as having mild malathion poisoning. There were no tests reported. Connected to this same accident, a woman in the lounge area of the women's restroom complained about the fumes. Apparently the spilled material had been washed down the drains which were interconnected to all the restrooms. She was taken to a hospital emergency room for examination and was then released.

Another incident involving twenty firemen occurred when a nursery caught on fire. They were examined only as a precautionary measure because unknown substances were burning and the extent of exposure was unknown. Of the suspect substances, malathion was in the largest amount - five gallons. No illnesses were diagnosed.

A policeman investigating a break-in at an exterminating company smelled malathion which had been present in the closed warehouse. He was examined at a hospital emergency room and released. No illness was diagnosed.

There were six eye exposure incidents that involved malathion. One man was feather-dusting the shelves in the garden chemical section of a feed and farm supply store. His eyes felt irritated so he washed them out, but three days later his left eye became inflamed. He then sought medical attention. Diagnosis was chemical conjunctivitis and the man was given

eye drops. Malathion or Sevin was thought to have been the pesticide, if any were involved. The report indicates the clerk had been having eye trouble for some time.

In two separate incidents, nursery workers had their eyes exposed to pesticides from plants that had been recently sprayed. In the first, a woman had mistakenly thought the foliage which had been sprayed with malathion and Pentac was dry. There were no cautionary signs on the greenhouse door, but she had been warned. Exposure occurred while handling the plants. She went immediately to a doctor who treated her uninflamed eyes and released her. No safety equipment was required and none was worn. In the other incident, the employee was spraying in a greenhouse. The product label did not call for protective devices. They were provided, though, but not worn. Protective devices would have prevented this accident, and should have been worn.

A gardener was spraying shrubs with malathion and chlordane with a power rig. He opened the valve to the hose lines and the valve screwed completely out of the base, spraying him with insecticide. He had been given rubber gloves and an apron to wear, which he did. There were no tests taken, and he was diagnosed as having chemical conjunctivitis of the eye. Immediately after the accident happened, a new type of valve was installed on the rig that eliminated the problem.

In another incident, a worker was filling a tank with malathion and water. The hose broke and sprayed him in the left eye. A baseline cholinesterase test had previously been run but none was run after the exposure. The hose was said to have been in good repair and there was no way to have prevented this accident. In general, though, conscientious maintenance will reduce the numbers of this type of accident.

A mixer/loader was adding malathion to a spray tank and a drop of liquid splashed up into his eye. No safety equipment was provided and none was worn. No tests were taken. The worker was given medicine and an eye patch. Eye protection would have prevented this incident.

There were six skin exposure incidents that involved malathion. Three were nursery workers, two of which worked at the same nursery but at different times of the year. All developed some dermatitis problems and none used protective equipment. The two workers from the same place of employment were planters. Both incidents involved malathion and diazinon. The first person claimed to have been sprayed accidentally by an applicator, and the other person stated that pesticide-sprayed foliage caused a rash. Applicators should not spray when other workers are working in the area. There were discrepancies in both investigations that indicated pesticides may not have caused the illnesses.

A nursery worker was dipping cuttings in a bucket containing malathion moving them to a pan containing rinse water, and then draining them. She developed a rash on her hand. The use of gloves would have prevented this incident.

A gardener had been spraying pesticides for six months. The chemicals he used most often were Weed Boomer, malathion, diazinon, Phytar, Maintain CF 125, and Weed-No-Mo. In the last month before going to the doctor, he said he began to have deterioration of his finger nails. Malathion is not known to have this effect.

A man who worked for a termite and pest control service had malathion and xylene leak onto his right hand causing redness between the fingers. The report did not state that protective equipment was provided, but if used, it should have provided protection from this exposure.

In a restaurant, roaches were sprayed for once a month with malathion. A man who worked at this restaurant claimed the spray made his legs break out in a rash.

A manufacturing worker developed a rash on her arms and hands after packing malathion bottles in boxes. She was provided gloves but chose not to wear them. She was treated by a physician and advised to avoid pesticides for two weeks. The use of gloves and a long-sleeved shirt would probably have prevented this incident.

TABLE 1

<u>Pesticide Involved</u>		<u>Toxicity</u>	<u>Number of Incidents</u>
<u>With Malathion</u>	<u>Chemical Type</u>	<u>Category</u>	<u>Coincidental with Malathion</u>
Parathion	OP	1	4
Diazinon	OP	2	2
Zectran	C	2	2
Metasystox	OP	3	1
Thiodan	CH	2 or 3	1
Perthane	CH	3	1
Sulfur	Misc.	3	1
Carbaryl	C	3	1
Pentac	CH	3	1
Chlordane	CH	2 or 3	1

OP - Organophosphate

C - Carbamate

CH - Chlorinated hydrocarbon

Misc. - Miscellaneous